

Attorney Docket No.: 129964/11863 (21635-0121)
Application No.: 10/814,896

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	SHAMBLEN, et al.	:	Confirmation No.: 7593
		:	
Application No.:	10/814,896	:	Group Art Unit: 1742
		:	
Filed:	March 31, 2004	:	Examiner: W. ZHU
		:	

For: MELTLESS PREPARATION OF MARTENSITIC STEEL ARTICLES HAVING
THERMOPHYSICALLY MELT INCOMPATIBLE ALLOYING ELEMENTS

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant files its Appeal Brief, together with a Fee Transmittal authorizing the charging of the required fee. A Notice of Appeal and fee are filed herewith.

Real party in interest

The real party in interest is General Electric Co.

Related appeals and interferences

Applicant is not aware of any related appeals and/or interferences.

Status of claims

Claims 1-22 were filed.

During prosecution, claims 1, 5, 13, and 14 were amended, and new claims 24-26 were added.

Claim 1-26 were finally rejected in a Final Office Action of March 7, 2007 ("Final Office Action" hereinafter). The final rejection of claims 1-26 is appealed.

Claims 1-26 are reproduced in Appendix I.

Status of amendments

A Response to Final Rejection was filed, but it contained no claim amendments.

Summary of claimed subject matter

There are three independent claims 1, 14, and 26. No claim has a means recitation.

The procedural steps of claim 1 are illustrated in the flow diagram of Figure 2, and a representative article is illustrated in Figure 1. The method steps are discussed in para. [0040]-[0074] of the Specification. The article is discussed in para. [0039] of the Specification.

Independent method claim 1 recites a method for preparing an article (20) of iron base metal alloyed with an alloying element. The method comprises the steps of providing (step 40) a chemically reducible nonmetallic base-metal precursor compound of the iron base metal, providing (step 42) a chemically reducible nonmetallic alloying-element precursor compound of an alloying element, wherein the alloying element is thermophysically melt incompatible with the iron base metal, thereafter mixing (step 44) the base-metal precursor compound and the alloying-element precursor compound to form a compound mixture, thereafter chemically reducing (step 48) the compound mixture to a metallic alloy, without melting the metallic alloy, and thereafter consolidating (step 50) the metallic alloy to produce a consolidated metallic article (20), without melting the metallic alloy and without melting the consolidated metallic article (20). The consolidated iron-base metallic article (20) is a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology.

The procedural steps of claim 14 are illustrated in the flow diagram of Figure 2, and a representative article is illustrated in Figure 1. The method steps are discussed in para. [0040]-[0074] of the Specification. The article is discussed in para. [0039] of the Specification.

Independent method claim 14 recites a method for preparing an article (20) made of iron base metal alloyed with an alloying element. The method comprises the steps of providing (step 40) a chemically reducible nonmetallic base-metal precursor compound of the iron base metal, providing (step 42) a chemically reducible nonmetallic alloying-element precursor compound of an alloying element that is thermophysically melt incompatible with the iron base metal, thereafter mixing (step 44) the base-metal precursor compound and the alloying-element precursor compound to form a compound mixture, thereafter chemically reducing (step 48) the compound mixture to produce a metallic alloy, without melting the metallic alloy, thereafter consolidating (step 50) the metallic alloy to produce a consolidated metallic article (20), without melting the metallic alloy and without melting the consolidated metallic article (20), wherein the consolidated iron-base metallic article (20) is a martensitic-composition steel, and post-processing (step 52) the consolidated metallic article (20) by heat treating the consolidated metallic article (20) to form a martensitic article (20). The martensitic article (20) includes a body-centered cubic phase or a body-centered tetragonal matrix phase, and wherein at least about 75 percent by volume of the body-centered cubic phase or the body-centered tetragonal matrix phase is present in an acicular phase morphology.

The procedural steps of claim 26 are illustrated in the flow diagram of Figure 2, and a representative article is illustrated in Figure 1. The method steps are discussed in para. [0040]-[0074] of the Specification. The article is discussed in para. [0039] of the Specification.

Method claim 26 recites a method for preparing an article (20) of iron base metal alloyed with an alloying element. The method comprises the steps of providing (step 40) a chemically reducible nonmetallic base-metal precursor compound of the iron base metal, and providing (step 42) a chemically reducible nonmetallic alloying-element precursor compound of an alloying element. The alloying element is thermophysically melt incompatible with the iron base metal and is selected from the group consisting of barium, calcium, cadmium, cerium, lithium, magnesium, manganese, zinc, aluminum, arsenic, copper, hafnium, lanthanum, tin, boron, gadolinium, rhenium, phosphorus, silicon, thorium, yttrium, zirconium, oxygen, sulfur, silver, indium, beryllium, antimony, and scandium. The method further includes thereafter mixing (step 44) the base-metal precursor compound and the alloying-element precursor compound to form a compound mixture, thereafter

chemically reducing (step 48) the compound mixture to a metallic alloy, without melting the metallic alloy, and thereafter consolidating (step 50) the metallic alloy to produce a consolidated metallic article (20), without melting the metallic alloy and without melting the consolidated metallic article (20). The consolidated iron-base metallic article (20) is a martensitic-composition steel.

Grounds of rejection to be reviewed on appeal

Ground 1. Claims 1, 2, 4-7, 9, 11, 12, and 14-23 are rejected under 35 USC 102 as anticipated by JP 57-164958 (JP '958).

Ground 2. Claims 13 and 24-26 are rejected under 35 USC 102 as anticipated by JP '958.

Ground 3. Claim 8 is rejected under 35 USC 103 over JP '958 in view of Fray (WO 99/64638 or U.S. Patent 6,712,952).

Ground 4. Claims 3 and 10 are rejected under 35 USC 103 over JP '958 in view of Armstrong U.S. Patent 5,958,106.

Ground 5. Claims 1-4 and 6-9 are rejected on the doctrine of obviousness-type double patenting over claims 1-4, 5, 11, 12, and 13 of Shamblen U.S. Patent 6,926,754.

Ground 6. Claims 14-20 are rejected on the doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 14-19 of Shamblen '754 and further in view of University of Cambridge (UOC) "Martensite and Martensitic Phase Transformation" internet download, "Martensite and Martensitic Phase Transformation" internet download.

(The Final Office Action stated this rejection as "Claims 14-20 are rejected under on the doctrine of obviousness-type double patenting over claims 1 and 14-19 of Shamblen '754." In the Advisory Action of June 4, 2007, the Examiner indicated that the rejection was mistakenly set forth in the Final Office Action, and requested that it be changed to that set forth above. Applicant agrees to the Examiner's request, but notes that Applicant's response will be altered from the discussion found in the response to the Final Office Action, to add the discussion of the newly added UOC reference.)

Ground 7. Claims 5, 11, and 12 are rejected on the doctrine of obviousness-type double patenting over claim 1 of Shamblen '754 in view of JP '958.

Ground 8. Claim 10 is rejected on the doctrine of obviousness-type double patenting over claim 1 of Shamblen '754 in view of JP '958 and further in view of Armstrong '106.

Ground 9. Claims 21-23 are rejected on the doctrine of obviousness-type double patenting over claim 1 of Shamblen '754 in view of UOC, and further in view of JP '958. Applicant traverses this ground of rejection.

Ground 10. Claim 13 is rejected on the doctrine of obviousness-type double patenting over claim 1 of Shamblen '754 in view of JP '958.

Ground 11. Claims 24-26 are rejected on the doctrine of obviousness-type double patenting as being unpatentable over claim 1 of Shamblen '754 in view of JP '958

Argument

Ground 1. Claims 1, 2, 4-7, 9, 11, 12, and 14-23 are rejected under 35 USC 102 as anticipated by JP 57-164958 (JP '958).

The following principle of law applies to §102 rejections. MPEP 2131 provides: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the ... claim. The elements must be arranged as required by the claim..." [citations omitted] This is in accord with the decisions of the courts. Anticipation under §102 requires 'the presence in a single prior art disclosure of all elements of a claimed invention arranged as in that claim.' Carella v. Starlight Archery, 231 USPQ 644, 646 (Fed. Cir., 1986), quoting Panduit Corporation v. Dennison Manufacturing Corp., 227 USPQ 337, 350 (Fed. Cir., 1985).

Thus, identifying a single element of the claim, which is not disclosed in the reference, is sufficient to overcome a §102 rejection.

Claims 1, 2, 4-7, 11

Claim 1 recites in part:

“consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology.”
[emphasis added]

JP ‘958 has no such disclosure. The reference does not disclose or teach body-centered cubic or body-centered tetragonal crystal structures and does not teach an acicular phase morphology, nor does it disclose that “at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal matrix phase is present in an acicular phase morphology.” JP ‘958 does not disclose the recited approach of claim 1.

The explanation of the rejection in the Non-Final Office Action of October 19, 2006, discussed and relied upon Example 1 of JP ‘958. Example 1 produced a material, which is illustrated in Figures 1-2 of JP ‘958. JP ‘958 does not suggest that the resulting structure is martensitic, and the resulting structure shown in Figures 1-2 is not acicular. JP ‘958 does not teach that the resulting structure is acicular or the other recited limitations.

There is an assertion that the structure produced by JP ‘958 would inherently have the recited microstructure (Final Office Action, page 2, 1-4 lines from bottom of page). As noted in the prior paragraph, Figures 1-2 of JP ‘958, which depict the structure resulting from Example 1 of JP ‘958, do not evidence the recited acicular microstructure, and in fact show something quite different. Nor is there any discussion suggesting that the approach of JP ‘958 results in the other recited features of claim 1.

But since the assertion of inherency is maintained contrary to the evidence of Figures 1-2 of JP 958, it is necessary to formally address that assertion. MPEP 2112-2113 sets forth the law on inherency. Inherency is not to be taken lightly and not to be asserted unless there is good evidence to suggest that the asserted property or characteristic is necessarily present in the teachings of the prior art reference. The concept of inherency is not provided as a way to fill in the gaps in missing disclosure or teachings based upon

speculation, unless the asserted property or characteristic may be shown to be necessarily present by objective evidence. Instead, “inherency” is used when every aspect of the disclosure of a reference and the claimed subject matter are otherwise the same, then it may be inferred that some property or characteristic further recited in the claim must necessarily be present in the art reference. MPEP 2112 provides “The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). “To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.’” In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted). “In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).”

Applicant requested that the Examiner demonstrate that the alleged structure necessarily is present in the material made by JP ‘958. The Examiner did not respond. Applicant does not see how it would be possible to establish that the alleged structure is necessarily present in the material produced by JP ‘958, in light of the absence of an acicular microstructure in Figures 1-2 of JP ‘958 and the fact that Figures 1-2 show a different microstructure. At a minimum, the evidence presented in Figures 1-2 of JP ‘958 is sufficient to show that JP ‘958 does not necessarily have the same properties, thereby shifting the burden to the Examiner to establish that the properties claimed are present in JP ‘958, see MPEP 2112.01. The Examiner has failed to make the showing or even respond to Applicant’s rebuttal. Therefore, the rejection fails to establish that the claims are anticipated.

Claim 9

Claim 9 depends from claim 1 and incorporates its limitations. Claim 1 is not disclosed by JP ‘958, as discussed above, and is allowable over this ground of rejection. Claim 9 is also therefore allowable over this ground of rejection.

Claim 9 further recites in part:

“chemically reducing the compound mixture by vapor-phase reduction.”

JP ‘958 has no such disclosure.

In vapor phase reduction, the nonmetallic precursor compounds are vapors or in the gaseous phase. As stated in para. [0058] of the present application, “In another approach, termed vapor-phase reduction because the nonmetallic precursor compounds are furnished as vapors or gaseous phase...” JP ‘958 does not disclose any processing in which the nonmetallic precursor compounds are vapors or in the gaseous phase, and the explanation of the rejection does not indicate any such location in JP ‘958.

Claim 12

Claim 12 depends from claim 1 and incorporates its limitations. Claim 1 is not disclosed by JP ‘958, as discussed above, and is allowable over this ground of rejection. Claim 12 is also therefore allowable over this ground of rejection.

Claim 12 further recites in part:

“post-processing the consolidated metallic article by heat treating the consolidated metallic article to form a martensitic article.”

As discussed earlier, JP ‘958 does not illustrate an article that is martensitic.

Claims 14, 16, 17, 18, 21, 23

Claim 14 recites in part:

“post-processing the consolidated metallic article by heat treating the consolidated metallic article to form a martensitic article.”

JP ‘958 has no such disclosure.

Claim 14 further recites in part:

“...the martensitic article includes a body-centered cubic phase or a body-centered tetragonal matrix phase, and wherein at least about 75 percent

by volume of the body-centered cubic phase or the body-centered tetragonal matrix phase is present in an acicular phase morphology.”

JP ‘958 has no such disclosure. The reference does not disclose or teach body-centered cubic or body-centered tetragonal crystal structures and does not teach an acicular phase morphology, nor does it disclose that “at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal matrix phase is present in an acicular phase morphology.” JP ‘958 does not disclose the recited approach of claim 14.

The explanation of the rejection in the Non-Final Office Action of October 19, 2006, discussed and relied upon Example 1 of JP ‘958. Example 1 produced a material, which is illustrated in Figures 1-2 of JP ‘958. JP ‘958 does not suggest that the resulting structure is martensitic, and the resulting structure shown in Figures 1-2 is not acicular or martensitic. JP ‘958 does not teach that the resulting structure is acicular or the other recited limitations.

There is an assertion that the structure produced by JP ‘958 would inherently have the recited microstructure (Final Office Action, page 2, 1-4 lines from bottom of page). Applicant incorporates the prior discussion of the requirements of establishing “inherency”-- that the feature is necessarily present. As noted in the prior paragraph, Figures 1-2 of JP ‘958, which depict the structure resulting from Example 1 of JP ‘958, do not evidence the recited acicular microstructure. Nor is there any discussion suggesting that the approach of JP ‘958 results in the other recited features of claim 14.

Applicant incorporates the prior discussion of the legal requirement to support an assertion of inherency.

Applicant requested that the Examiner demonstrate that the alleged structure necessarily is present in the material made by JP ‘958. The Examiner did not respond when Applicant raised this point during prosecution. Applicant does not see how it would be possible to establish that the alleged structure is necessarily present in the material produced by JP ‘958, in light of the absence of an acicular microstructure in Figures 1-2 of JP ‘958. At a minimum, the evidence presented in Figures 1-2 of JP ‘958 is sufficient to show that JP ‘958 does not necessarily have the same properties, thereby shifting the burden to the Examiner to establish that the properties claimed are present in JP ‘958, see MPEP 2112.01. The Examiner has failed to make the showing or even respond to Applicant’s rebuttal. Therefore, the rejection fails to establish that the claims are anticipated.

Claim 15

Claim 15 depends from claim 14 and incorporates its limitations. Claim 14 is not disclosed by JP '958, as discussed above, and is allowable over this ground of rejection. Claim 15 is also therefore allowable over this ground of rejection.

Claim 15 further recites in part:

“providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element has a vapor pressure of greater than about 10 times a vapor pressure of the iron base metal in a melt of the iron base metal, both measured at a melt temperature.”

JP' 958 has no such disclosure.

Claim 19

Claim 19 depends from claim 14 and incorporates its limitations. Claim 14 is not disclosed by JP '958, as discussed above, and is allowable over this ground of rejection. Claim 19 is also therefore allowable over this ground of rejection.

Claim 19 further recites in part:

“providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element exhibits a miscibility gap with the iron base metal in the liquid phase.”

JP '958 has no such disclosure.

Claim 20

Claim 20 depends from claim 14 and incorporates its limitations. Claim 14 is not disclosed by JP '958, as discussed above, as discussed above, and is allowable over this ground of rejection. Claim 20 is also therefore allowable over this ground of rejection.

Claim 20 further recites in part:

“providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element, if melted, chemically reacts with a crucible material or a melting atmosphere.”

JP ‘958 has no such disclosure.

Claim 22

Claim 22 depends from claim 14 and incorporates its limitations. Claim 14 is not disclosed by JP ‘958, as discussed above, and is allowable over this ground of rejection. Claim 22 is also therefore allowable over this ground of rejection.

Claim 22 further recites in part:

“chemically reducing the compound mixture to produce the metallic alloy in the form of a spongy mass.”

JP ‘958 has no such disclosure. Applicant took care to discuss the production of a spongy mass, see para. [0060] and para. [0063] of the Specification, and even illustrated a spongy mass in Figure 3.

Ground 2. Claims 13 and 24-26 are rejected under 35 USC 102 as anticipated by JP ‘958.

Applicant incorporates from the Ground 1 rejection the legal requirements for a §102 rejection.

Claim 13

Claim 13 depends from claim 1 and incorporates its limitations. Claim 1 is not disclosed by JP ‘958, as discussed above, and is allowable over this ground of rejection. Claim 13 is also therefore allowable over this ground of rejection.

Claim 13 further recites in part:

“an additional step, performed prior to the step of consolidating, of
producing a mixture of a metallic material and an other additive constituent.”

The explanation of the rejection references the addition of carbides and nitrides, disclosed at page 10, first paragraph of the translation. Carbides and nitrides do not meet the definition of “an other additive constituent. As defined in para. [0061] of the Specification, “Some constituents, termed “other additive constituents”, may be difficult to introduce.”

Claim 24

Claim 24 depends from claim 1 and incorporates its limitations. Claim 1 is not disclosed by JP ‘958, and is allowable over this ground of rejection. Claim 24 is also therefore allowable over this ground of rejection.

Claim 24 further recites in part:

“providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element has a vapor pressure of greater than about 10 times a vapor pressure of the iron base metal in a melt of the iron base metal, both measured at a melt temperature.”

JP ‘958 has no such disclosure.

Claim 25

Claim 25 depends from claim 1 and incorporates its limitations. Claim 1 is not disclosed by JP ‘958, as discussed above, and is allowable over this ground of rejection. Claim 25 is also therefore allowable over this ground of rejection.

Claim 25 further recites in part:

“providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element exhibits a miscibility gap with the iron base metal in the liquid phase.”

JP ‘958 has no such disclosure.

Claim 26

Claim 26 recites in part:

“providing a chemically reducible nonmetallic alloying-element precursor compound of an alloying element, wherein the alloying element is thermophysically melt incompatible with the iron base metal and is selected from the group consisting of barium, calcium, cadmium, cerium, lithium, magnesium, manganese, zinc, aluminum, arsenic, copper, hafnium, lanthanum, tin, boron, gadolinium, rhenium, phosphorus, silicon, thorium, yttrium, zirconium, oxygen, sulfur, silver, indium, beryllium, antimony, and scandium;”

The explanation of the rejection relies on the presence of manganese in this recitation and the mention of manganese in JP '958. JP '958 does not disclose the presence of a precursor compound of manganese as claim 26 recites. Only metallic manganese is disclosed to be present as an impurity in Fe₂O₃ (Translation of JP '958, page 16, lines 4-5). Claim 26 recites the presence of a precursor compound of a thermophysically melt incompatible element, with manganese being one such element.

Ground 3. Claim 8 is rejected under 35 USC 103 over JP '958 in view of Fray (WO 99/64638 or U.S. Patent 6,712,952).

MPEP 2142, under ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS, provides: “To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. [citations omitted]. See MPEP para 2143-2143.03 for decisions pertinent to each of these criteria.”

First requirement--there must be an objective basis for combining the teachings of the references

The first of the requirements of MPEP 2142 is that “there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings.” The present rejection is a §103 combination rejection. To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2142, 2143 and 2143.01. See *also*, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir., 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

“The PTO has the burden under §103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.”

And, at 5 USPQ2d 1600:

“One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.”

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

“Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).”

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* * * * *

“The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).”

* * * * *

“A statement that modifications of the prior art to meet the claimed invention would have been ‘well within the ordinary skill of the art at the time the claimed invention was made’ because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).”

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure. In this case, there is no objective basis set forth in the Office Action. An advantage claimed by Fray is disclosed, but that is not a reason to combine the teachings of Fray with those of JP ‘958. JP ‘958 already discloses an approach for performing its process on iron-base alloys, and there is no reason to substitute Fray’s approach for that of JP ‘958. Fray’s advantages are stated relative to the prior approach, not relative to the approach disclosed by JP ‘958 for iron-base alloys.

Second requirement--there must be
an expectation of success

The second of the requirements of MPEP 2142 is an expectation of success. There is no expectation of success...This requirement has not been addressed in the explanation of the rejection, and in any event more than Examiner’s argument is required here.

As stated in MPEP 2142, “The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. [citations omitted].”

Nothing in either reference suggests that the approach of Fray would be operable and successful with the iron-base alloys disclosed by JP ‘958.

Third requirement--the prior art
must teach the claim limitations

The third of the requirements of MPEP 2142 is that “the prior art reference (or references when combined) must teach or suggest all the claim limitations.” In this regard, the following principle of law applies to all §103 rejections. MPEP 2143.03 provides “To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).” [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

Claim 8 incorporates the limitations of claim 1, which are not taught by JP ‘958 for the reasons stated earlier and which are incorporated here. Fray adds nothing in this regard.

Claim 8 further recites in part:

“the step of chemically reducing includes the step of
chemically reducing the compound mixture by fused salt electrolysis.”

The “compound mixture” is that recited in claim 1:

“providing a chemically reducible nonmetallic base-metal precursor compound of the iron base metal;
providing a chemically reducible nonmetallic alloying-element precursor compound of an alloying element, wherein the alloying element is thermophysically melt incompatible with the iron base metal; thereafter
mixing the base-metal precursor compound and the alloying-element precursor compound to form a compound mixture.”

Neither reference teaches that a “compound mixture” having an iron base-metal precursor may be chemically reduced by fused salt electrolysis.

Ground 4. Claims 3 and 10 are rejected under 35 USC 103 over JP '958 in view of Armstrong U.S. Patent 5,958,106 (Armstrong '106).

Applicant incorporates the discussion of the Ground 1-Ground 3 rejections.

This is a §103 combination rejection, and must meet the requirements set forth under Ground 3.

First requirement--there must be an objective basis for combining the teachings of the references

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure. In this case, there is no objective basis set forth in the Office Action. An advantage claimed by Armstrong for the disclosure therein is disclosed, but that is not a reason to combine the teachings of Armstrong with the separate and independent teachings of JP '958. JP '958 already discloses an approach for performing its process on iron-base alloys, and there is no reason to substitute Armstrong's approach for that of JP '958. Armstrong's stated advantages are stated relative to the prior approach, not relative to the approach disclosed by JP '958 for iron-base alloys.

Second requirement--there must be an expectation of success

Nothing in either reference suggests that the approach of Armstrong would be operable and successful with the iron-base alloys disclosed by JP '958.

Third requirement--the prior art must teach the claim limitations

Claim 3 incorporates the limitations of claim 1, which are not taught by JP '958 for the reasons stated earlier and which are incorporated here. Armstrong adds nothing in this regard.

Claim 3 further recites in part:

“...the step of providing the chemically reducible nonmetallic base-metal precursor compound includes the step of
providing the chemically reducible nonmetallic base-metal precursor compound in a gaseous form,”

The base metal here is iron, as recited in the first “providing” step of claim 1: “providing a chemically reducible nonmetallic base-metal precursor compound of the iron base metal.” Neither reference suggests that a precursor compound for iron, the recited base metal, may be provided in gaseous form.

Ground 5. Claims 1-4 and 6-9 are rejected on the doctrine of obviousness-type double patenting as being unpatentable over claims 1-4, 5, 11, 12, and 13 of Shamblen U.S. Patent 6,926,754.

Shamblen is not properly applied in this rejection or in the Ground 6-11 rejections, as it teaches directly away from the present approach. Shamblen claim 1 teaches a method for making a superalloy, see col. 16, lines 19-20 (“chemically reducing the compound mixture to produce a metallic superalloy”) and lines 22-24 (“consolidating the metallic superalloy to produce a consolidated metallic article, without melting the metallic superalloy...”).

In an obviousness-type double patenting rejection, the teaching must be in the claims, but one is permitted to look to the specification of the reference for the definitions of terms. Shamblen defines the term “superalloy” that is recited in its claims in the following terms, at col. 3, line 65-col. 4, line 13:

“As used herein, a ‘superalloy’ is a nickel-base, cobalt-base, iron-base, iron-nickel-base, or iron-nickel-cobalt-base alloy having at least two phase, including a continuous matrix phase with a face-centered-cubic crystal structure that is strengthened by both solid solution strengthening and the presence of one or more additional discrete phases that are distributed throughout the matrix phase, where the discrete phases have a different composition than the matrix phase. The strengthening discrete phase or phases present in the superalloy in its fully heat treated, service condition form, is at least about 5 percent by volume in the case of iron-base alloys...”
[emphasis added]

The present independent claim 1 recites in part:

“a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology.”
[emphasis added]

(Claim 14 has a similar recitation.)

As any metallurgist knows, a face-centered cubic crystal structure as taught by Shamblen is the very antithesis of the body-centered cubic or body-centered tetragonal crystal structure matrix phase as recited in the present claims. Distributed discrete phases as in Shamblen are the antithesis of the acicular phase of the present claims. The teachings of Shamblen’s claims are therefore directly contrary to the presently claimed approach.

It is a well-established principle of law that a prima facie case of obviousness may not properly be based on a reference which teaches away from the present invention as recited in the claims.

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. In re Sponnoble, 160 USPQ 237 244 (CCPA 1969)...As “a useful general rule,”...“a reference that ‘teaches away’ can not create a prima facie case of obviousness.” In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994).”

The reason for this holding is self-evident. If the reference teaches away from the recited approach, there is no basis for reversing that teaching to produce a facsimile of the claimed invention, other than a pure hindsight reconstruction.

Shamblen simply cannot be used as a basis for an obviousness-type rejection, whether it be under §103 or a double-patenting rejection, because it teaches away from the recitations of the claims in the two indicated ways.

But even if Shamblen is applied as a reference, it does not underlie the obviousness-type double patenting rejections.

MPEP 804 discusses the basis for the obviousness-type double patenting rejection. As set forth there,

“In determining whether a nonstatutory basis exists for a double patenting rejection, the first question to be asked is--does any claim in the application define an invention that is merely an obvious variation of an invention claimed in the patent? If the answer is yes, then an ‘obviousness-type’ nonstatutory double patenting rejection may be appropriate. Obviousness-type double patenting requires rejection of an application claim when the claimed subject matter is not patentably distinct from the subject matter claimed in a commonly owned patent when the issuance of a second patent would provide unjustified extension of the term of the right to exclude granted by a patent. [citations omitted]

“A double patenting rejection of the obviousness-type is ‘analogous to [a failure to meet] the nonobviousness requirement of 35 USC 103’ except that the patent principally underlying the double patenting rejection is not considered prior art. [citation omitted] Therefore, any analysis employed in an obviousness-type double patenting rejection parallels the guidelines for analysis of a 35 USC 103 obviousness determination. [citations omitted].”

Following this approach, the following principle of law applies to all §103 and obviousness-type double patenting rejections. MPEP 2143.03 provides “To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art, in this case the claims of the patent underlying the double patenting rejection. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art, in this case the claims of the patent underlying the double patenting rejection. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).” [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art, or in this case the claims of the patent underlying the double patenting rejection. If limitations are not found in any of the applied prior art, in this case the claims of the patent underlying the double patenting rejection, the rejection cannot stand. In this case, the claims of the patent underlying the double patenting rejection clearly do not arguably teach some limitations of the claims.

Claims 1-4 and 6-9

The present claim 1 recites in part:

“consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology.”

The claims of Shamblen '754 have no such teaching. Specifically, the claims of Shamblen '754 have no teaching that its approach may be used with a martensitic-composition steel. In its most favorable interpretation to the rejection, Shamblen '754 expressly limits his claimed invention to superalloys (col. 16, line 20) made of precursors of iron-base metals (col. 16, line 10), but makes no mention of the materials and limitations recited in claim 1 and quoted above. Claims 2-4 and 6-9 depend from claim 1 and incorporate this same limitation. Accordingly, none of claims 1-4 and 6-9 is an obvious variation of the claims of Shamblen '754.

The Examiner's position is that the recitation of “iron-base” in Shamblen is sufficient to teach the limitation of claim 1, “a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology.” The Examiner's position is not correct. The present claim 1 recites a different class of alloys.

Ground 6. Claims 14-20 are rejected on the doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 14-19 of Shamblen '754 and further in view of University of Cambridge (UOC) “Martensite and Martensitic Phase Transformation” internet download, “Martensite and Martensitic Phase Transformation” internet download.

Shamblen is not properly applied as a reference for the reasons stated in relation to the Ground 5 rejection, which discussion is incorporated here.

This obviousness-type double patenting rejection must be analyzed in the same manner as any §103 combination rejection, see MPEP 804 discussed earlier and incorporated here.

First requirement--there must be an objective basis for combining the teachings of the references

There is no objective basis for combining the teachings of Shamblen and UOC. Shamblen '754 expressly limits his claimed invention "to produce a metallic superalloy" (col. 16, lines 19-20). The invention recited in the claims of Shamblen has nothing to do with martensitic steels, and UOC deals only with martensitic steels. The explanation of the rejection argues that "it would be obvious...to heat-treat the consolidated iron based metallic article in claim 1 of '754 B2 in order to form a martensitic steel..." There is nothing at all in claim 1 of '754 to suggest that Shamblen's approach may be used to prepare a martensitic steel. Nor is there anything in UOC to suggest that its martensitic steel may be made by an approach like that of Shamblen. There is no objective basis for combining the teachings of these two references.

Second requirement--there must be an expectation of success

There is nothing in either reference to suggest that Shamblen's approach may be used to prepare martensitic steels, and nothing in UOC to suggest that martensitic steels may be produced by the approach of Shamblen.

Third requirement--the prior art must teach the claim limitations

Claims 14-20

Claim 14 recites in part:

"consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel; and

post-processing the consolidated metallic article by heat treating the consolidated metallic article to form a martensitic article, wherein the martensitic article includes a body-centered cubic phase or a body-centered tetragonal matrix phase, and wherein at least about 75 percent by volume of the body-centered cubic phase or the body-centered tetragonal matrix phase is present in an acicular phase morphology.”

The references have no such teaching. Neither reference teaches making a martensitic-composition steel without melting the metallic alloy and without melting the consolidated metallic article, where the martensitic article is defined in the manner recited in the above-quoted excerpt from claim 14. The mere fact that UOC may mention martensite does not meet this limitation.

Ground 7. Claims 5, 11, and 12 are rejected on the doctrine of obviousness-type double patenting over claim 1 of Shamblen ‘754 in view of JP ‘958.

Shamblen is not properly applied as a reference for the reasons stated in relation to the Ground 5 rejection, which discussion is incorporated here.

This obviousness-type double patenting rejection must be analyzed in the same manner as any §103 combination rejection, see MPEP 804 discussed earlier and incorporated here.

First requirement--there must be an objective basis for combining the teachings of the references

Claim 1 of Shamblen ‘754 teaches that the mixture is chemically reduced “to produce an iron-base alloy” (in the reading most favorable to the rejection, at col. 16, lines 19-20) that results in a metallic superalloy (col. 16, line 20). JP ‘958 deals with alloys, which are not superalloys. There is no reason to believe that Shamblen ‘754 could be used to make the non-superalloys of JP ‘958. The explanation of the rejection gives no basis for combining the teachings of these two references.

Second requirement--there must be an expectation of success

There is nothing in either reference to suggest that Shamblen's approach may be used successfully to prepare alloys according to JP '958.

Third requirement--the prior art
must teach the claim limitations

Claim 5

Claim 5 depends from claim 1.

Claim 1 recites in part:

“consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology.”

Neither reference has such a teaching as to the nature of the martensitic article.

Claim 11

Claim 11 depends from claim 1, and incorporates its limitations. The limitations of claim 1 are not taught by the combination of the references for the reasons stated in relation to the rejection of claim 5, which are incorporated here.

Additionally, claim 11 recites in part:

“post-processing the consolidated metallic article”

Neither reference has a teaching of the post-processing of superalloys as taught by the claims of Shamblen.

Claim 12

Claim 12 depends from claim 1, and incorporates its limitations. The limitations of claim 1 are not taught by the combination of the references for the reasons stated in relation to the rejection of claim 5, which are incorporated here.

Additionally, claim 12 recites in part:

“post-processing the consolidated metallic article by heat treating the consolidated metallic article to form a martensitic article.”

Neither reference has a teaching of the post-processing of superalloys as taught by the claims of Shamblen to form a martensitic article.

Ground 8. Claim 10 is rejected on the doctrine of obviousness-type double patenting over claim 1 of Shamblen '754 in view of JP '958 and further in view of Armstrong '106.

Shamblen is not properly applied as a reference for the reasons stated in relation to the Ground 5 rejection, which discussion is incorporated here.

Applicant incorporates the prior discussions of the grounds of rejection.

First requirement--there must be an objective basis for combining the teachings of the references

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure. In this case, there is no objective basis set forth in the Office Action. An advantage claimed by Armstrong is disclosed, but that is not a reason to combine the teachings of Armstrong with those of JP '958. JP '958 already discloses an approach for performing its process on iron-base alloys, and there is no reason to substitute Armstrong's approach for that of JP '958. Armstrong's stated advantages are stated relative to the prior approach, not relative to the approach disclosed by JP '958 for iron-base alloys.

Claim 1 of Shamblen '754 teaches that the mixture is chemically reduced to produce a metallic superalloy (claim 16, line 20) from a precursor of an iron-base alloy (in the reading most favorable to the rejection, see col. 16, line 10). JP '958 deals with martensitic

steels. There is nothing in either reference to suggest that the approach of Shamblen '754 may be used to produce martensitic steels or martensitic-steel compositions, which are not superalloys. The explanation of the rejection gives no basis for combining the teachings of these two references.

Second requirement--there must be
an expectation of success

There is nothing in either reference to suggest that Shamblen's approach may be used to prepare martensitic steels.

Nothing in either reference suggests that the approach of Armstrong would be operable and successful with the disclosed by JP '958.

Third requirement--the prior art
must teach the claim limitations

Claim 1, from which claim 10 depends, recites in part:

"consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology."
[emphasis added]

None of the references has such a teaching as to the nature of the martensitic article.

Ground 9. Claims 21-23 are rejected on the doctrine of obviousness-type double patenting over claim 1 of Shamblen '754 in view of University of Cambridge (UOC), and further in view of JP '958.

Shamblen is not properly applied as a reference for the reasons stated in relation to the Ground 5 rejection, which discussion is incorporated here.

Applicant incorporates the prior discussions of the grounds of rejection.

First requirement--there must be an objective basis for combining the teachings of the references

There is no objective basis for combining the teachings of Shamblen and UOC. Shamblen '754 expressly limits his claimed invention "to produce a metallic superalloy" which may be an iron-base superalloy (col. 16, lines 10, 19-20). The invention recited in the claims of Shamblen has no teaching of martensitic steels, and UOC deals only with martensitic steels. The explanation of the rejection argues that "it would be obvious...to heat-treat the consolidated iron based metallic article in claim 1 of '754 B2 in order to form a martensitic steel..." There is nothing at all in claim 1 of '754 to suggest that Shamblen's approach may be used to prepare a martensitic steel. Nor is there anything in UOC to suggest that its martensitic steel may be made by an approach like that of Shamblen. There is no objective basis for combining the teachings of these two references.

Second requirement--there must be an expectation of success

There is nothing in either reference to suggest that Shamblen's approach may be used to prepare martensitic steels, and nothing in UOC to suggest that martensitic steels may be produced by the approach of Shamblen.

Third requirement--the prior art must teach the claim limitations

The rejected claims, in their dependence from claim 14, each recites in part:

"consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel; and

post-processing the consolidated metallic article by heat treating the consolidated metallic article to form a martensitic article, wherein the

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martensitic article includes a body-centered cubic phase or a body-centered tetragonal matrix phase, and wherein at least about 75 percent by volume of the body-centered cubic phase or the body-centered tetragonal matrix phase is present in an acicular phase morphology.”

The references have no such teaching. Neither reference teaches making a martensitic-composition steel without melting the metallic alloy and without melting the consolidated metallic article, where the martensitic article is defined in the manner recited in the above-quoted excerpt from claim 14. The mere fact that UOC may mention martensite does not meet this limitation, which is much more specific.

Additionally, claim 22 recites in part:

“chemically reducing the compound mixture to produce the metallic alloy in the form of a spongy mass.”

The references have no such teaching of a spongy mass.

Ground 10. Claim 13 is rejected on the doctrine of obviousness-type double patenting over claim 1 of Shamblen ‘754 in view of JP ‘958.

Shamblen is not properly applied as a reference for the reasons stated in relation to the Ground 5 rejection, which discussion is incorporated here.

Applicant incorporates the discussion of the prior rejections.

First requirement--there must be an objective basis for combining the teachings of the references

Claim 1 of Shamblen ‘754 teaches that the mixture is chemically reduced “to produce an iron-base alloy” (in the reading most favorable to the rejection, at col. 16, lines 19-20) that results in a metallic superalloy (col. 16, line 20). JP ‘958 deals with martensitic steels. There is no reason to believe that Shamblen ‘754 could be used to make martensitic steels or martensitic-steel compositions, which are not iron-base superalloys. The explanation of the rejection gives no basis for combining the teachings of these two references.

Second requirement--there must be
an expectation of success

There is nothing in either reference to suggest that Shamblen's approach may be
used to prepare martensitic steels.

Third requirement--the prior art
must teach the claim limitations

Claim 13, through its dependence from claim 1, recites in part:

“consolidating the metallic alloy to produce a consolidated metallic
article, without melting the metallic alloy and without melting the consolidated
metallic article, wherein the consolidated iron-base metallic article is a
martensitic-composition steel that is capable of being heat treated to produce
a structure having a continuous body-centered cubic or body-centered
tetragonal crystal structure matrix phase wherein at least about 75 percent by
volume of the body-centered cubic or body-centered tetragonal crystal
structure matrix phase is present in an acicular phase morphology.”
[emphasis added]

Neither the claims of Shamblen '754 nor JP '958 has such a teaching as to the
nature of the martensitic article.

Ground 11. Claims 24-26 are rejected on the doctrine of obviousness-type double
patenting as being unpatentable over claim 1 of Shamblen '754 in view of JP '958.

Shamblen is not properly applied as a reference for the reasons stated in relation to
the Ground 5 rejection, which discussion is incorporated here.

Applicant incorporates the discussion of the prior double patenting rejections.

First requirement--there must be an objective
basis for combining the teachings of the references

Claim 1 of Shamblen '754 teaches that the mixture is chemically reduced "to produce an iron-base alloy" (in the reading most favorable to the rejection, at col. 16, lines 19-20) that results in a metallic superalloy (col. 16, line 20). JP '958 deals with martensitic steels. There is no reason to believe that Shamblen '754 could be used to make martensitic steels. or martensitic-steel compositions. The explanation of the rejection gives no basis for combining the teachings of these two references.

Second requirement--there must be
an expectation of success

There is nothing in either reference to suggest that Shamblen's approach may be used to prepare martensitic steels.

Third requirement--the prior art
must teach the claim limitations

Claims 24-25, through their dependence from claim 1, each recites in part:

"consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology."
[emphasis added]

Neither the claims of Shamblen '754 nor JP '958 has such a teaching as to the nature of the martensitic article.

Claim 26 recites in part:

"providing a chemically reducible nonmetallic alloying-element precursor compound of an alloying element, wherein the alloying element is thermophysically melt incompatible with the iron base metal and is selected from the group consisting of barium, calcium, cadmium, cerium, lithium,

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magnesium, manganese, zinc, aluminum, arsenic, copper, hafnium, lanthanum, tin, boron, gadolinium, rhenium, phosphorus, silicon, thorium, yttrium, zirconium, oxygen, sulfur, silver, indium, beryllium, antimony, and scandium;"

Neither the claims of Shamblen nor JP '958 teach precursor compounds of these recited elements. Certainly there is no mention in the claims of Shamblen. The explanation of the rejection relies on the presence of manganese in this recitation and the mention of manganese in JP '958. JP '958 does not disclose the presence of a precursor compound of manganese as claim 26 recites. Only metallic manganese is disclosed to be present as an impurity in Fe_2O_3 (Translation of JP '958, page 16, lines 4-5). Claim 26 recites the presence of a precursor compound of a thermophysically melt incompatible element, with manganese being one such element.

SUMMARY AND CONCLUSION

The prior art rejections (Grounds 1-4) are all based on JP '958. This reference simply does not disclose or teach the recited limitation "the consolidated iron-base metallic article is a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology" [quote from claim 1], and the secondary references also do not teach it.

The double patenting grounds of rejection (Grounds 5-11) are all based on Shamblen. The claims of Shamblen teach directly away from the present claims, because Shamblen teaches face-centered-cubic crystal-structure superalloys, while the present claims recite structures that are body-centered cubic or body-centered tetragonal crystal structure. These are mutually incompatible teachings.

Applicant asks that the Board reverse the grounds of rejection.

For all of the foregoing reasons, Applicant asks that the Board reverse the rejections. The Commissioner is authorized to charge any fees that may be due or credit any overpayments to the undersigned's Account Number 50-1059.

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APPENDIX I

Copy of Claims Involved in the Appeal

1. A method for preparing an article of iron base metal alloyed with an alloying element, comprising the steps of

providing a chemically reducible nonmetallic base-metal precursor compound of the iron base metal;

providing a chemically reducible nonmetallic alloying-element precursor compound of an alloying element, wherein the alloying element is thermophysically melt incompatible with the iron base metal; thereafter

mixing the base-metal precursor compound and the alloying-element precursor compound to form a compound mixture; thereafter

chemically reducing the compound mixture to a metallic alloy, without melting the metallic alloy; and thereafter

consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel that is capable of being heat treated to produce a structure having a continuous body-centered cubic or body-centered tetragonal crystal structure matrix phase wherein at least about 75 percent by volume of the body-centered cubic or body-centered tetragonal crystal structure matrix phase is present in an acicular phase morphology.

2. The method of claim 1, wherein the step of providing the chemically reducible nonmetallic base-metal precursor compound includes the step of

providing the chemically reducible nonmetallic base-metal precursor compound in a finely divided solid form, and

wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound in a finely divided solid form.

3. The method of claim 1, wherein the step of providing the chemically reducible nonmetallic base-metal precursor compound includes the step of

providing the chemically reducible nonmetallic base-metal precursor compound in a gaseous form, and

wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound includes the step of

providing a chemically reducible nonmetallic alloying-element precursor compound in a gaseous form.

4. The method of claim 1, wherein the step of providing a chemically reducible nonmetallic base-metal precursor compound includes the step of providing a chemically reducible base-metal oxide.

5. The method of claim 1, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound further includes the step of providing a further alloying-element precursor compound of a further alloying element, wherein the further alloying element is not thermophysically melt incompatible with the iron base metal.

6. The method of claim 1, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of providing a chemically reducible alloying-element oxide.

7. The method of claim 1, wherein the step of chemically reducing includes the step of chemically reducing the compound mixture by solid-phase reduction.

8. The method of claim 1, wherein the step of chemically reducing includes the step of chemically reducing the compound mixture by fused salt electrolysis.

9. The method of claim 1, wherein the step of chemically reducing includes the step of chemically reducing the compound mixture by vapor-phase reduction.

10. The method of claim 1, wherein the step of chemically reducing includes the step of chemically reducing the compound mixture by contact with a liquid selected from the group consisting of a liquid alkali metal and a liquid alkaline earth metal.

11. The method of claim 1, including an additional step, after the step of consolidating, of
post-processing the consolidated metallic article.

12. The method of claim 1, including an additional step, after the step of consolidating, of
post-processing the consolidated metallic article by heat treating the consolidated metallic article to form a martensitic article.

13. The method of claim 1, including an additional step, performed prior to the step of consolidating, of
producing a mixture of a metallic material and an other additive constituent.

14. A method for preparing an article made of iron base metal alloyed with an alloying element, comprising the steps of
providing a chemically reducible nonmetallic base-metal precursor compound of the iron base metal;

providing a chemically reducible nonmetallic alloying-element precursor compound of an alloying element that is thermophysically melt incompatible with the iron base metal; thereafter

mixing the base-metal precursor compound and the alloying-element precursor compound to form a compound mixture; thereafter

chemically reducing the compound mixture to produce a metallic alloy, without melting the metallic alloy; thereafter

consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel; and

post-processing the consolidated metallic article by heat treating the consolidated metallic article to form a martensitic article, wherein the martensitic article includes a body-centered cubic phase or a body-centered tetragonal matrix phase, and wherein at least about 75 percent by volume of the body-centered cubic phase or the body-centered tetragonal matrix phase is present in an acicular phase morphology.

15. The method of claim 14, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element has a vapor pressure of greater than about 10 times a vapor pressure of the iron base metal in a melt of the iron base metal, both measured at a melt temperature.

16. The method of claim 14, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element has a melting point different from that of the iron base metal by more than about 400°C.

17. The method of claim 14, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element has a density difference with the iron base metal of greater than about 0.5 gram per cubic centimeter.

18. The method of claim 14, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element chemically reacts with the iron base metal or another element in a liquid phase to form a chemical compound including the alloying element.

19. The method of claim 14, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element exhibits a miscibility gap with the iron base metal in the liquid phase.

20. The method of claim 14, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element, if melted, chemically reacts with a crucible material or a melting atmosphere.

21. The method of claim 14, including an additional step, after the step of mixing and before the step of chemically reducing, of
compacting the compound mixture.

22. The method of claim 14, wherein the step of chemically reducing includes the step of

chemically reducing the compound mixture to produce the metallic alloy in the form of a spongy mass.

23. The method of claim 14, including an additional step, prior to the step of mixing, of

providing a chemically reducible nonmetallic alloying-element compatible precursor compound of an alloying element that is not thermophysically melt incompatible with the iron base metal, and

wherein the step of mixing includes the step of

mixing the base-metal precursor compound, the alloying-element precursor compound, and the alloying-element compatible precursor compound to form a compound mixture.

24. The method of claim 1, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element has a vapor pressure of greater than about 10 times a vapor pressure of the iron base metal in a melt of the iron base metal, both measured at a melt temperature.

25. The method of claim 1, wherein the step of providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element includes the step of

providing the chemically reducible nonmetallic alloying-element precursor compound of the alloying element, wherein the alloying element exhibits a miscibility gap with the iron base metal in the liquid phase.

26. A method for preparing an article of iron base metal alloyed with an alloying element, comprising the steps of

providing a chemically reducible nonmetallic base-metal precursor compound of the iron base metal;

providing a chemically reducible nonmetallic alloying-element precursor compound of an alloying element, wherein the alloying element is thermophysically melt incompatible with the iron base metal and is selected from the group consisting of barium, calcium, cadmium, cerium, lithium, magnesium, manganese, zinc, aluminum, arsenic, copper, hafnium, lanthanum, tin, boron, gadolinium, rhenium, phosphorus, silicon, thorium, yttrium, zirconium, oxygen, sulfur, silver, indium, beryllium, antimony, and scandium; thereafter

mixing the base-metal precursor compound and the alloying-element precursor compound to form a compound mixture; thereafter

chemically reducing the compound mixture to a metallic alloy, without melting the metallic alloy; and thereafter

consolidating the metallic alloy to produce a consolidated metallic article, without melting the metallic alloy and without melting the consolidated metallic article, wherein the consolidated iron-base metallic article is a martensitic-composition steel.

APPENDIX II

Evidence Entered and Relied Upon in the Appeal

None.

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APPENDIX III

Related Proceedings

None.